RECEIVED
CENTRAL FAX CENTER
OCT 12 2004

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being sent via facsimile to the RightFax facsimile number provided on the PTO website for all facsimile transmissions (703-872-9306) on the date shown below. This facsimile transmission includes a total of 41 pages.

JANET FARR
(Type or print name of person faxing paper)

Date: October 12, 2004

Janet Farr
(Signature of person faxing paper)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Docket No: BLASP2225US

In re application of:

Applicant: Marco Corbetta Examiner: William P. Lehner

Serial No.: 10/022,133 Art Unit: 2671

Filing Date: December 13, 2001 Confirmation No. 2796

Title: **METHOD, COMPUTER PROGRAM PRODUCT AND SYSTEM FOR RENDERING SOFT SHADOWS IN A FRAME REPRESENTING A 3-D SCENE**

APPEAL BRIEF

VIA FACSIMILE
M/S Appeal Briefs - Patents
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313

Dear Sir:

This Appeal Brief is submitted in the above-identified application in response to the final Office Action mailed April 06, 2004. Appellants' Notice of Appeal was received in OIPE on August 10, 2004. Accordingly, Appellants' Appeal Brief is timely filed, with no extension of time, October 10 being a Sunday and October 11 being a USPTO holiday.

Thomas W. Adams
Registration No. 35,047
RENNER, OTTO, BOISSELLE & SKLAR
1621 Euclid Ave., 19th Floor
Cleveland, Ohio 44115
(216) 621-1113

TABLE OF CONTENTS

RECEIVED ☑003
CENTRAL FAX CENTER
OCT 12 2004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Docket No: BLASP2225US

In re application of:

Applicant:	Marco Corbetta	Examiner:	William P. Lehner
Serial No.:	10/022,133	Art Unit:	2671
Filing Date:	December 13, 2001	Confirmation No. 2796	

Title: **METHOD, COMPUTER PROGRAM PRODUCT AND SYSTEM FOR RENDERING SOFT SHADOWS IN A FRAME REPRESENTING A 3-D SCENE**

APPEAL BRIEF

VIA FACSIMILE
M/S Appeal Briefs - Patents
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313

Dear Sir:

This Appeal Brief is submitted in the above-identified application in response to the final Office Action mailed April 06, 2004. Appellants' Notice of Appeal was received in OIPE on August 10, 2004. This Appeal Brief is submitted in accordance with 37 C.F.R. 41.30-41.54, the rules newly promulgated by the Office and effective as of September 13, 2004, as indicated in 69 Fed. Reg. 155, pp. 50005-50009.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Crytek GmbH, Rosenauer Strasse 16, Coburg, Germany 96450.

II. RELATED APPEALS AND INTERFERENCES

Appellants are aware of no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-22 are presently pending in the Application. Claims 1-22 stand finally rejected and are the subject of the present Appeal. The Appendix contains a copy of all of claims 1-22.

IV. STATUS OF AMENDMENT

No amendment under 37 C.F.R. 1.116(a) was filed in this application.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Appellant's invention, in one embodiment as described in claim 1, relates to a method for rendering soft shadows in a frame representing a three-dimensional scene, which is defined by a list of polygons and comprises a plurality of three-dimensional objects, said method comprising the steps of:

from a light source's (301) point of view: (p. 14, line 35 to p.15, line 20; Fig. 3)

determining edges (305, 401B) casting shadows (302) from said list of polygons;

computing shadow volumes (302) and computing (p. 16, line 3 to p.18, line 21) soft shadow edges (501) from said edges (401B) casting shadows;

(p. 18, line 3 to p.21, line 9; Fig. 10) creating up to six squared empty textures of the same size, each of them becoming a face of a cubemap (1014) representing a cube centered at the light source's (301) point of view, said faces of said cubemap being aligned with orthogonal major axes with the light source's position (301) as origin;

(p.28, line 10 – line 29) rendering into at least one face of said cubemap an appropriate part of said scene with full brightness color and rendering a representation

(506A – 506C) of soft shadows into said at least one face (1014) of said cubemap using said edges casting shadows (1012) and said soft shadow edges (1013) computed;

from a point of view of a viewer viewing said scene:

(p.23, line 35-38) rendering a visible part of the scene into a z-buffer with colors, lighting and texture information disabled for generating depth information;

(p.23, line 38 – p.24, line 14; p.27, line 37 – p.28, line 8) rendering said shadow volumes into a stencil buffer (1007) in combination with said z-buffer information; and

(p.27, line 17 – p.31, line 21) in a single pass, rendering said scene (1002) with colors, lighting and texture information enabled and applying said cubemap (1014) to said scene for rendering said representation (1006) of said soft shadows into said scene using a texture coordinate generation while performing a stencil test operation (p:21, line 22 – p.27, line 17) for preventing the scene to be drawn in shadowed areas, to produce a soft shadowed image.

Appellant's invention, in one embodiment as described in claim 11, relates to a computer program product for rendering soft shadows in a frame representing a three-dimensional scene, which is defined by a list of polygons and comprises a plurality of three-dimensional objects, comprising:

program code means (p.11, line 40 – p.12, line 8) for performing, from a light source's (301) point of view, the steps of (p.31, line 35 – p.34, line 26; Fig. 2A – 2B):

determining (p.14, line 33 – p.15, line 20; Fig. 3) edges (305, 401B) casting shadows (302) from said list of polygons (step S203);

computing shadow volumes (302) and computing (p.16, line 3 – p.18, line 2) soft shadow edges (501) from said edges (401B) casting shadows (step 205);

(p.18, line 3 – p.21, line 9; Fig. 10) creating up to six squared empty textures of the same size, each of them becoming a face of a cubemap (1014) representing a cube centered at the light source's (301) point of view, said faces of said cubemap being aligned with orthogonal major axes with the light source's position (301) as origin (step S204);

rendering into at least one face of said cubemap an appropriate part of said scene with full brightness color and rendering a representation (506A – 506C) of soft shadows into said at least one face (1014) of said cubemap using said edges casting shadows (1012) and said soft shadow edges (1013) computed (step S206);

program code means (p.11, line 40 – p.12, line 8) for performing, from a point of view of a viewer viewing said scene, the steps of:

(p.23, line 35-38) rendering a visible part of the scene into a z-buffer with colors, lighting and texture information disabled for generating depth information (step S208);

(p.23, line 38 – p.24, line 14; p.27, line 37 – p.28, line 8) rendering said shadow volumes into a stencil buffer (1007) in combination with said z-buffer information (step S209); and

(p.27, line 17 – p.31, line 21) in a single pass, rendering said scene (1002) with colors, lighting and texture information enabled and applying said cubemap (1014) to said scene for rendering said representation (1006) of said soft shadows into said scene using a texture coordinate generation while performing (p.21, line 22 – p.27, line 17) a stencil test operation (S210 – S213) for preventing the scene to be drawn in shadowed areas, to produce a soft shadowed image.

Appellant's invention, in one embodiment as described in claim 21, relates to a system (p.10, line 19 – p.12, line 42; Fig. 1) for rendering a three-dimensional scene comprising a plurality of three-dimensional objects formed by polygons and for rendering soft shadows in said scene:

a) a color buffer for storing color values;

b) a z-buffer for storing depth values;

c) a stencil buffer for storing stencil mask information;

d) texture memory for storing texture information;

e) a rasterizer for converting each of the polygons into color, depth and stencil values;

f) a first pixel engine in communication with the rasterizer and the texture memory for copying or drawing directly a portion of the color buffer into an appropriate texture representing a specific cubemap side;

g) a second pixel engine in communication with the rasterizer, the z-buffer and the stencil buffer for receiving said polygons and performing a depth compare operation and a stencil test operation based on the result of the depth compare operation; and

h) a third pixel engine in communication with the rasterizer, the z-buffer, the stencil buffer and the texture memory for receiving said polygons and performing a depth compare operation, a stencil test operation and a texture coordinate generation operation, based on the result from the depth compare and stencil test, for transferring into the non-shadowed areas of the frame buffer the appropriate pixels of the appropriate side of the cubemap.

The present invention addresses the problem of rendering soft shadows in a frame representing a 3-D scene, where the scene includes a plurality of 3-D objects generated by a computer. That is, the invention provides a method and system for artificially creating appropriate, realistic-appearing soft shadows. The present invention is particularly useful in rendering soft shadows in graphics rendering systems and interactive applications, in particular games software for PC or video games or games for game or video consoles. While similar methods have been attempted in the prior art, none of the prior art methods operate in accordance with the method and system of the presently claimed invention. an object of this application to provide a method for rendering soft shadows which is less time-consuming and poses lesser requirements to the hardware environment.

According to the method of the present invention, soft shadows are created in a fundamentally different way than from the prior art. As summarized in Fig. 10 of this application, firstly, an edge connectivity system is used to quickly find shadow silhouettes, which are extracted and extruded to form soft shadow edges; then a combined shadow volume algorithm is applied only to those edges to compute a representation of soft shadows, which is then rendered into a cube map (reference numeral 1014 in Fig. 10 of

this application). This cube map determines soft shadows to be rendered in the scene into a single pass.

This approach greatly reduces the fillrate (i.e., the number of pixels which must be specified) needed for drawing soft shadow volumes, because the number of soft shadow volumes is usually only a small fraction of the shadow polygons' total screen area. Thus, the method according to this application is far less time-consuming and poses far lesser requirements to the hardware environment than the method according to Frazier (1) to (3), where a comparison must be performed for each pixel, or than any other prior art cited.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-22 stand rejected under 35 U.S.C. § 103(a), as obvious over a large number of prior art references, to wit: Claims 1-3 and 11-13 stand rejected as obvious over Frazier (1) "Index Cube Shadow Mapping in OpenGL," in view of Frazier (2) "Real-Time Per-Pixel Point Lights and Spot Lights in OpenGL," further in view of Frazier (3) "Advanced Real-Time Per-Pixel Lighting in OpenGL,", further in view of Kato, U.S. Patent No. 5,999,185, further in view of Kilgard "Improving Shadows and Reflections via the Stencil Buffer," and further in view of Foran, U.S. Patent No. 5,742,749.

Claims 4, 5, 14 and 15 stand rejected as obvious over Frazier (1) "Index Cube Shadow Mapping in OpenGL," in view of Frazier (2) "Real-Time Per-Pixel Point Lights and Spot Lights in OpenGL," further in view of Frazier (3) "Advanced Real-Time Per-Pixel Lighting in OpenGL,", further in view of Kato, U.S. Patent No. 5,999,185, further in view of Kilgard "Improving Shadows and Reflections via the Stencil Buffer," and further in view of Foran, U.S. Patent No. 5,742,749, and further in view of Peercy, U.S. Patent No. 5,880,736.

Claims 6, 7, 9, 10, 16, 17 and 19-22 stand rejected as obvious over Frazier (1) "Index Cube Shadow Mapping in OpenGL," in view of Frazier (2) "Real-Time Per-Pixel Point Lights and Spot Lights in OpenGL," further in view of Frazier (3) "Advanced Real-Time Per-Pixel Lighting in OpenGL,", further in view of Kato, U.S. Patent No. 5,999,185,

further in view of Kilgard "Improving Shadows and Reflections via the Stencil Buffer," and further in view of Foran, U.S. Patent No. 5,742,749, and further in view of Snyder, U.S. Patent No. 6,252,608.

Claims 8 and 18 stand rejected as obvious over Frazier (1) "Index Cube Shadow Mapping in OpenGL," in view of Frazier (2) "Real-Time Per-Pixel Point Lights and Spot Lights in OpenGL," further in view of Frazier (3) "Advanced Real-Time Per-Pixel Lighting in OpenGL,", further in view of Kato, U.S. Patent No. 5,999,185, further in view of Kilgard "Improving Shadows and Reflections via the Stencil Buffer," and further in view of Foran, U.S. Patent No. 5,742,749, and further in view of Snyder, U.S. Patent No. 6,252,608, and further yet in view of Dietrich, "Cube Maps".

Appellants respectfully submit that the sheer number of references required to be combined in support of the rejections shows the dubious basis for the rejections, and this is borne out in the rejections by the piecemeal assembly of the claimed elements.

VII. ARGUMENT

A. Claims 1-3 and 11-13 Would Not Have Been Obvious over the Contended Combination of Frazier (1), Frazier (2), Frazier (3), Kato, Kilgard and Foran; and Hence All of Claims 1-22 Are Patentable Over the Contended Combination of These References.

Claims 1-3 and 11-13 stand rejected as obvious over Frazier (1) "Index Cube Shadow Mapping in OpenGL," in view of Frazier (2) "Real-Time Per-Pixel Point Lights and Spot Lights in OpenGL," further in view of Frazier (3) "Advanced Real-Time Per-Pixel Lighting in OpenGL,", further in view of Kato, U.S. Patent No. 5,999,185, further in view of Kilgard "Improving Shadows and Reflections via the Stencil Buffer," and further in view of Foran, U.S. Patent No. 5,742,749. Appellants respectfully traverse this rejection for at least the following reasons.

Appellant respectfully requests the Board to reverse the Examiner's rejection of these claims on all grounds and to allow all of the presently pending claims. The rejections

are clearly erroneous and contrary to law; accordingly there is no basis for rejecting Appellant's claims and the rejections should be reversed.

Appellant incorporates herein by reference in their entirety the arguments set forth in Appellant's Reply to Office Action filed January 23, 2004 with respect to the contended combination of prior art references. For the sake of brevity those arguments are not repeated herein verbatim.

As noted above, Appellants respectfully submit that the sheer number of references required to be combined in support of the rejections shows the dubious basis for the rejections, and this is borne out in the rejections by the piecemeal assembly of the claimed elements. Specifically, the rejections are set forth and based upon an element by element find of obviousness of each individual modification or combination seriatim, not by the legally required showing of obviousness of the claimed invention as a whole. For this reason, the rejections of all of Appellant's claims should be reversed.

Appellant notes that the Examiner has previously and is likely to contend again that Appellant is attacking the references individually. To the extent this contention is correct, Appellant is required to do so, due entirely to the Examiner's piecemeal use of the references, in which the Examiner found one modification after another to be obvious, until finally the Examiner had gathered enough pieces to conclusorily state that Appellant's invention would have been obvious. It was in response to Appellant's showing that the Examiner's rejection was wholly piecemeal that the Examiner made the contention that Appellant was attacking the references individually. This is an incorrect statement of Appellant's argument and showing. What Appellant argued and showed was that the Examiner had in fact found individual differences obvious, and at no time ever showed or even alleged that the invention as a whole would have been obvious.

Overall, the Examiner found, in piecemeal fashion, that five separate modifications of the basic reference(s) Frazier (1), (2), (3), each taken alone, would have been obvious, and then the Examiner used this piecemeal analysis as the sole basis for rejection of Appellant's claims. First, in paragraph 3, the Examiner contends it would have been

obvious to modify the contended combination of Frazier (1), (2), (3) with Kato to render soft shadows. Second, in paragraph 5, the Examiner contends it would have been obvious to modify Frazier (1) with Kato to compute soft shadow edges from edges casting shadows. Third, in paragraph 9, the Examiner contends it would have been obvious to modify the contended combination of Frazier (1), (2), (3) and Kato with Kilgard to disable lighting, colors, and textures. Fourth, in paragraph 11, the Examiner contends it would have been obvious to modify the contended combination of Frazier (1), (2), (3) and Kato and Kilgard with Foran to use texture coordinates. Fifth, in paragraph 12, the Examiner contends it would have been obvious to modify the contended combination of Frazier (1), (2), (3) and Kato and Kilgard with Foran to combine the shadow testing pass and rendering pass. *At no time does the Examiner ever even contend that the claimed invention as a whole would have been obvious, much less ever show why all the piecemeal allegedly obvious modifications would have been combined as a whole.* Such a piecemeal rejection simply cannot stand. For this reason alone, the rejections are legally erroneous and must be reversed. The rejections of Appellant's claims in the present case fail to comport with either the facts or the law as enunciated by the Federal Circuit and set forth in the MPEP. Appellant respectfully requests the Board to so reverse the Examiner's rejections of all of Appellant's claims.

1. The Disclosures of Frazier (1), (2) and (3) Differ Fundamentally from the Claimed Invention and Can Not Provide a Basis for the Contended Obviousness.

In setting forth the rejections, the Examiner relied primarily on Frazier (1), (2) and (3), together with Kato, Kilgard and Foran. Appellant submits that the Examiner's reading, usage and interpretation of Frazier (1), (2) and (3) is clearly erroneous for at least the following reasons.

As stated in Frazier (1), page 1, lines 1 to 3, Frazier (3) introduces two techniques for creating shadows, namely the method of "shadow volumes" and the method of "depth mapped shadows." Neither correspond to the claimed invention.

Shadow volumes: When creating "shadow volumes", every polygon in the scene that can cast a shadow is determined, then the polygon is projected away from the light over an infinite distance and then anything that lies within the shadow volume of a polygon is shadowed by that polygon (compare first paragraph of chapter 'SHADOW VOLUMES' of Frazier (3)). These shadow volumes are then rendered to the stencil buffer, which is used to perform the stencil test operation as explained in detail with reference to Fig. 9 of this application. Clearly, in this method a cube map is not used.

Depth mapped shadows: When creating "depth mapped shadows", a depth map of the scene from the light's point of view is created, then the pixel's depth from the light source is computed and the respective depth value compared to the corresponding pixel in the depth buffer. If the depth buffer value is closer than the pixel to be rendered, the pixel is shadowed, otherwise it is lit (compare first paragraph of chapter 'DEPTH MAPPED SHADOWS' of Frazier (3)).

Thus, the method of depth mapped shadows explicitly relies on a comparison of depth values. In contrast, according to the claimed invention a representation of soft shadows is rendered into at least one face of the cubemap.

This significant difference between Frazier (1), (2), (3) and the claimed invention further becomes apparent when studying Frazier (1), where the basics of index cube shadow mapping are discussed. As described in the chapter 'BASICS OF INDEX CUBE SHADOW MAPPING' of Frazier (1), both techniques, namely index cube shadow mapping and depth cube shadow mapping, compare the polygons visible to the camera and to the light and if they are not the same polygon, then the pixel should be shadowed.

Thus, according to Frazier (1) to (3) neither shadows nor soft shadows are rendered to a cubemap which is then applied to the scene for rendering a representation of shadows or soft shadows into the scene using a texture coordinate generation, as claimed by present claims 1 and 11.

In contrast to the claimed invention, the cube map disclosed in Frazier (1) is only used as a type of organization scheme for storing the depth values.

In item 11 on page 13 of the Final Rejection the Examiner states that the pictures on page 4, 5, 7, 8 and 17 of Frazier (3) show soft shadows and that according to page 5 of Frazier (1) a shadow is also drawn on the inside of a tire. These arguments are irrelevant to the claimed method of using cube maps including a representation of soft shadows, in accordance with the present invention.

According to Frazier (1) index cube maps are used and shadows are generated on the basis of a comparison between index values. Accordingly, the shadow drawn onto the inner side of the tire is not generated by applying a cubemap with a representation of the shadows to the scene using a texture coordinate generation, i.e. the shadow is created in a fundamentally different way. It is further noted that the shadow drawn on the inner side of the tire according to Frazier (1) is not a soft shadow.

Frazier (3) relates to per-pixel-lighting and the effects (a) of diffuse lighting, i.e. when no clearly identifiable light source is available, and (b) of specular lighting, i.e. when light reflected from a specular surface of an object illuminates the scene. The soft edges of the illuminated light volumes have nothing at all to do with soft shadows. As is well-known, any light source has a limited power and the farther away from the light source one gets the more diffuse the illumination becomes. This, and nothing else, can be recognized in the figures of Frazier (3). This effect has, however, nothing to do with soft shadows.

Any shadows visible in these pictures are generated in a fundamentally different manner, namely on the basis of a comparison between the pixel's depth from the light source to a pixel value stored in a depth buffer or on the basis of shadow volumes.

The above comparison must, however, be performed for each pixel (compare Frazier (1), line 2 of chapter 'BASICS OF INDEX CUBE SHADOW MAPPING' on page 1). Such a comparison for each pixel is time-consuming and requires advanced hardware.

The method of the present invention is much less time-consuming and requires less advanced hardware.

As shown by the foregoing, Frazier (1), (2) and (3) do not support the Examiner's contentions with respect to these combined references.

Frazier (1) to (3) is based on a comparison between depth values, which must be performed for each pixel. According to Frazier (1) to (3), if the polygons visible to the camera and to the light aren't the same, then the pixel is shadowed otherwise it is lit. The result of this comparison is necessarily a binary value, which results in that the pixel is either rendered as a shadow or not rendered as a shadow.

When performing such a comparison, there is no possibility to 'blur' the limit value, i.e. the identity of the depth values to thus obtain soft shadows (i.e. a blurred shadow)

In contrast, according to Kato soft shadows are computed and rendered directly into the scene to be drawn. Even if the person skilled in the art would combine the teachings of Frazier (1) to (3) with that of Kato, he would not obtain the method of the claimed invention. The Examiner's mere contention that it would have been obvious to modify Frazier (1), (2), (3) to render soft shadows as taught by Kato fails to show either factually or legally that Appellant's claimed invention *as a whole* would have been obvious. Kato might suggest to one to try to find a way to apply soft shadows to Frazier (1), (2), (3), but this does not show the obviousness of the claimed invention *as a whole*.

The Examiner refers to Fig. 66 of Kato, contending that this demonstrates soft shadow edges on shadow polygon 425 from edges casting shadows from cube 420. However, a reading of Kato's description of Fig. 66, at col. 41, lines 35-67, reveals that all Kato does is define a 100% and a 0% concentration of shadow and linearly interpolate between them. In Kato, the soft shadow edges are simply projections on a flat ground plane, and this is not applicable at all in a normal environment.

Namely, if the person skilled in the art would combine the teaching of Kato with the method of shadow volumes of Frazier (1) to (3), he would directly modify the edges of the shadow volumes as taught by Kato for rendering the edges of the shadow volumes softer. In such a method, no cube maps would be used. On the other hand, if the person skilled in the art would combine the teaching of Kato with the method of depth mapped shadows of Frazier (1) to (3), he would conclude that it does not make sense to render

representations of soft shadows into a map including only depth information of the scene to be rendered.

The Examiner contends in paragraph 6 that Frazier (1) creates six faces of a cub map representing a cube centered at the light source. However, to the extent Frazier (1) does this, it is for the purpose of per-pixel lighting, which differs from the claimed method.

Accordingly, the teaching of Kato, namely to render soft shadows cannot be adapted to the approach according to Frazier (1) to (3). This would not even make sense and, from the technical point of view, cannot work as Frazier (1) to (3) relies on a comparison between depth values or index values.

It is further noted that the soft shadows according to Kato are simply projections on a flat ground surface, as can be concluded directly from Fig. 66 and e.g. col. 41, lines 32-34 of Kato. Such simple projections are of no use in the graphical representation of a real 3D-environment.

Accordingly, Applicant submits that there exists a clear and significant structural difference between the claimed invention and the prior art to patentably distinguish the claimed invention from the prior art.

The prior art is also not capable of performing the intended use, namely to render soft shadows, as the result of the comparison will always be a binary result but not a graded result, i.e. a result lying somewhere between an upper and a lower limit value.

For the foregoing reasons, Applicant respectfully requests the Board to reverse the Examiner's rejection of the pending claims.

2. The Examiner Failed to State a *Prima Facie* Case of Obviousness.

The Examiner in both the first and final Office actions carried out a piecemeal, cobbled-together analysis of the myriad pieces of prior art in a failed attempt to state a *prima facie* case of obviousness. In the present case, the Examiner has engaged in wholesale hindsight, picking and choosing among the references to find the needed

elements, then having found what the Examiner considers to be all the elements of Appellant's claims, concluded that the whole invention would have been obvious. This rejection fails on both factual and legal grounds.

It required all of paragraphs 3-12 of the Office Action for the Examiner to cobble together the various contentions required to show, piece by piece, that the pieces would have been obvious, in support of the alleged obviousness of claim 1. As shown by the foregoing, at no time did the Examiner ever even attempt to show that the *invention as a whole* would have been obvious.

In paragraph 3, the Examiner contended that since Frazier (1) discloses a method of creating shadows, but admittedly fails to teach creating soft shadows, and since Kato creates soft shadows because they appear natural, it would have been obvious to modify Frazier (1) to create soft shadows as taught by Kato "because they appear natural".

This does not show the obviousness of the claimed invention as a whole.

In paragraph 4, the Examiner contends that Frazier (1) has shadow volumes, that volumes and cubes imply a 3D scene and that polygons cast shadows on other polygons. The Examiner failed to identify or explain what, if any, possible significance these observations have. This paragraph fails to show anything with respect to the contended obviousness of the claimed invention as a whole.

In paragraph 5, the Examiner admitted that Frazier (1) does not compute soft shadow edges from edges casting shadows. The Examiner stated that Kato's Fig. 66 demonstrates soft shadow edges on shadow polygon 425 from edges casting shadows from cube 420 "because this is used to create the soft shadows". Thereupon, the Examiner concluded that yet another piece of the claimed invention would have been obvious, contending that it would have been obvious to modify Frazier (1) to compute soft shadow edges from edges casting shadows as taught by Kato "because this is used to create soft shadows". This circular justification cannot possibly support the obviousness of even this one small part of the claimed invention, much less the claimed

invention as a whole.

In paragraph 6, the Examiner observes that Frazier (1) creates six faces of a cube map representing a cube centered at the light source, and contends that Frazier (2) says this is aligned with orthogonal major axes. The Examiner failed to identify or explain what, if any, possible significance these observations have. This paragraph fails to show anything with respect to the contended obviousness of the claimed invention as a whole.

In paragraph 7, the Examiner observes that Frazier (1) shows the scene rendered on all six faces of the cube with full brightness and color. The Examiner repeats that Kato teaches rendering soft shadows using edges casting shadows and computing soft shadow edges. The Examiner failed to identify or explain what, if any, possible significance these observations have. This paragraph fails to show anything with respect to the contended obviousness of the claimed invention as a whole.

In paragraph 8, the Examiner contends that, from the point of view of the viewer, Frazier (1) computes the distance or depth from the camera to polygon pixels, and that Frazier (3) states that this depth is stored in a z-buffer or depth-buffer. The Examiner failed to identify or explain what, if any, possible significance these observations have. This paragraph fails to show anything with respect to the contended obviousness of the claimed invention as a whole.

In paragraph 9, the Examiner admits that Frazier (1), (2) and (3) and Kato all fail to render the scene into the z-buffer with the light, colors and textures disabled. But, the Examiner cited Kilgard, and contends that this reference provides code to perform this depth test with the light disabled and colors not updated "because it saves time". Thereupon, the Examiner concluded that yet another piece of the claimed invention would have been obvious, contending that it would have been obvious to modify Frazier (1), (2) and (3) and Kato to disable lighting, colors and textures as taught by Kilgard, with the contended motivation being to save time. Exactly which components and what combination of the myriad elements of Frazier (1), (2) and (3) and Kato are to be so

modified, the Examiner failed to explain. Thus, the Examiner contends that another isolated element of the claimed invention would have been obvious. This, however, again fails to show the obviousness of the claimed invention as a whole.

In paragraph 10, the Examiner observes that Frazier (1) renders shadow volumes into a stencil buffer in combination with the depth-buffer information. The Examiner failed to identify or explain what, if any, possible significance these observations have. This paragraph fails to show anything with respect to the contended obviousness of the claimed invention as a whole.

In paragraph 11, the Examiner contends that Frazier (1), (2) and (3), Kato and Kilgard render the full scene, apply a cube map for rendering soft shadows, and use a stencil test to prevent the scene to be drawn in shadowed areas, but admits that this combination uses depth coordinates instead of texture coordinates in the stencil test. The Examiner contends that Foran teaches that depth coordinates are generated as if they were texture coordinates because these coordinates can be converted from light coordinates and project the texture map into the scene being rendered. The Examiner thereupon concludes that it would have been obvious to modify Frazier (1), (2) and (3), Kato and Kilgard to use texture coordinates as taught by Foran "because they can be converted from light coordinates and project the texture map into the rendered scene." Exactly which components and what combination of the myriad elements of Frazier (1), (2) and (3), Kato and Kilgard are to be so modified, the Examiner failed to explain. Similarly, the Examiner's contended motivation does not bear any clear relationship to the contended modifications and combinations. Thus, the Examiner contends that yet another isolated element of the claimed invention would have been obvious. This, however, again fails to show the obviousness of the claimed invention as a whole.

Finally, in paragraph 12, the Examiner admits that Frazier (1), (2) and (3), Kato and Kilgard do not perform the shadow test and render the scene in one pass. The Examiner contends that Foran teaches that the shadow test pass and the pass that draws the scene with full illumination can be combined, because this would be faster.

The Examiner thereupon concludes that it would have been obvious to modify Frazier (1), (2) and (3), Kato and Kilgard to use texture coordinates as taught by Foran "because it would be faster." Exactly which components and what combination of the myriad elements of Frazier (1), (2) and (3), Kato and Kilgard are to be so modified, the Examiner failed to explain.

Thus, the Examiner contends that yet another isolated element of the claimed invention would have been obvious. This, however, again fails to show the obviousness of the claimed invention as a whole.

With respect to the teaching of Foran regarding the single pass, what Foran teaches doing in a single pass is not the same as what Appellant's claim recites doing in a single pass. The mere fact that some steps in Foran possibly might be carried out in a single step does not mean that the different steps set forth in Appellant's claims could be carried out in a single step.

Foran discloses, from col. 10, line 59 to col. 11, line 6:

> The generated depth map is used to create shadows in a multi-pass rendering process. Pass 1 produces a hidden surface-removed image of the scene using only ambient illumination. In pass 2, a shadow test is performed and a shadow coefficient generated. The tested values in pass 2 are: 1) a predetermined number of depth map samples retrieved from the depth map based on an iterated depth map index; and 2) an iterated depth coordinate of the pixel being rendered. The shadow coefficient is then set by comparison of the iterated depth map coordinate to each of the predetermined number of depth map samples. Generation of the shadow coefficient is the weighted average of the samples not in shadow relative to the iterated depth map index. Pass 3 draws the scene with full illumination, where portions of the scene that are in shadow remain dark as a function of the shadow coefficient. It would be apparent to one skilled in the art to combine various passes, e.g. pass 2 and pass 3, or to perform all functions in a single pass.

While Foran's steps 1, 2 and 3 might be carried out in a single pass, this does

not mean that other, different steps, such as those recited in Appellant's claims ("rendering said scene with colors, lighting and texture information enabled and applying said cubemap to said scene for rendering said representation of said soft shadows into said scene using a texture coordinate generation while performing a stencil test operation for preventing the scene to be drawn in shadowed areas, to produce a soft shadowed image"), might be carried out in a single pass. At best, this teaching of Foran constitutes an invitation to experiment, perhaps, at the very best, an "obvious to try" situation. However, as is well settled in the law, "obvious to try" does not beget or equate to obviousness, and cannot provide a basis for an obviousness rejection of the claimed invention as a whole.

As stated in paragraph 15, claim 11 is rejected on the same basis as is claim 1. For the same reasons as set forth in the foregoing with respect to claim 1, the rejection of claim 11 is clearly erroneous, without legal basis, and should be reversed, since the claimed invention as a whole would not have been obvious, and the Examiner has failed to state a *prima facie* case of obviousness with respect to claim 11.

As shown by the foregoing, the Examiner's contended case of obviousness amounts to nothing more than a series of allegedly obvious pieces and parts of the invention, taken one by one in isolation, and then somehow (never explained by the Examiner) all neatly combined together into an allegedly obvious whole. This rejection completely fails to comport with the law or with proper procedures as set forth in the MPEP.

Appellant respectfully requests the Board to reverse the Examiner's rejection of all of Appellant's claims 1-22.

B. Claims 2 and 12 Further Distinguish Over and Are Patentable Over the Contended Combination.

In paragraph 13 of the Office Action, the Examiner contended that claims 2 and 12 would have been obvious, based on the following:

> In regard to claims 2 and 12, Frazier (3) says that color 1 and color 2 contain alpha values and they are blended (page 1, lines 19-41). Again, Kato teaches that the shadow casting edges are used to compute the soft shadow edges.

This statement completely fails to even attempt to show the alleged obviousness of claims 2 and 12, and fails to provide any basis whatsoever for rejection of these claims.

Accordingly, the rejection of claims 2 and 12 must be reversed for this reason alone.

With respect to the substance of the contended combination and modification, it Is noted again that the soft shadows according to Kato are simply projections on a flat ground surface, as can be concluded directly from Fig. 66 and e.g. col. 41, lines 32-34 of Kato. Such simple projections are of no use in the graphical representation of a real 3D-environment.

In contrast, according to the claimed invention the use of the cubemap enables to project realistic omnidirectional shadows into a 3D-scene to be rendered.

Furthermore, the cubemap comprises 6 faces, corresponding to six orthogonal directions in space. If the view direction is suddenly changed, e.g. from left to right, according to the claimed invention simply another face of the cubemap is used. This other face of the cubemap already comprises all necessary information on soft shadows that can be seen in the other direction. Accordingly, build-up time of the new image of the scene is much faster than according to the prior art. In particular, according to Kato all projections have to be calculated again, at least if the view direction is changed.

Accordingly, the rejection of claims 2 and 12 should be reversed for this additional reason as well.

C. Claims 3 and 13 Further Distinguish Over and Are Patentable Over the Contended Combination.

In paragraph 14 of the Office Action, the Examiner contends that Frazier (1) computes shadow polygons, but admits that Frazier (1) does not create soft shadow polygons that are dark on one edge and bright on another. The Examiner cited Kato for the teaching that there can be a concentration gradient between the interior of the basic shadow polygon and the boundary between this and detailed shadow polygons. The Examiner states that Kato discloses the concentrations of the regions in between are linearly "interpreted" (*sic*, interpolated) because this creates a soft shadow that fades from darkness to brightness. Thereupon, the Examiner concluded that yet another piece of the claimed invention would have been obvious, contending that it would have been obvious to modify Frazier (1) to create soft shadow polygons that are dark on one edge and bright on another as taught by Kato "because it would be *possible* to interpolate between full ambient brightness and full ambient darkness to create a fading soft shadow" (emphasis added).

Here again, the Examiner has conclusorily stated the rejection, based on only two parts of two references, without explaining how this ties in with the rest of the contended combination of references.

In addition, the contended motivation fails. The Examiner can only contend that it would be *possible* to do what he contends would have been obvious, without showing any teaching or suggestion that it should be done.

Accordingly, the rejection of claims 3 and 13 should be reversed.

D. Claims 4, 5, 14 and 15 Further Distinguish Over and Are Patentable Over the Contended Combination.

In paragraphs 16 and 17, the Examiner attempted to state his rejections of claims 4, 5, 14 and 15. Again, the rejections are piecemeal, finding the modifications necessary to reach various parts of the claimed invention obvious, but never setting

forth a proper case for the alleged obviousness of these claims *as a whole*.

In paragraph 16, the Examiner admitted that Frazier (1), (2), (3) does not compute vertices of additional shadow polygons, but contended that Kato generates soft shadow polygon vertices from a vector extending outward by a predetermined distance δ. Thereupon, the Examiner concluded that yet another piece of the claimed invention would have been obvious, contending that it would have been obvious to modify Frazier (1), (2), (3) to generate soft shadow polygon vertices by extending outward along a vector by a predetermined distance δ as taught by Kato "because this creates soft shadow polygons". This rejection fails for the same reason as do all the other rejections - it is without basis and the Examiner has failed to provide any but a wholly conclusory statement of the alleged obviousness.

Furthermore, the alleged motivation is circular. Basically, the Examiner contends that it would have been obvious to compute soft shadow polygon vertices because doing so would create additional soft shadow polygons. Such circular logic cannot possibly support a *prima facie* case of obviousness.

In paragraph 17, the Examiner admits that Frazier (1), (2), (3), Kato, Kilgard and Foran do not compute a vector given by a cross product between a normalized vector along shadow casting edges and a surface normal. The Examiner resorted to Peercy, which he contends calculates a cross product between a shading vector and a normal at the surface to determine how the surface is shadowed. On this basis, the Examiner conclusorily stated that it would have been obvious to modify Frazier (1), (2), (3), Kato, Kilgard and Foran to calculate a cross product between a shading vector and a normal at the surface because this determines how the surface is shadowed. This rejection fails for the same reason as do all the other rejections - it is without basis and the Examiner has failed to provide any but a wholly conclusory statement of the alleged obviousness.

Furthermore, the alleged motivation is circular. Basically, the Examiner contends that it would have been obvious to calculate a cross product between a shading vector

and a normal at the surface to determine how the surface is shadowed because doing so would determine how the surface is shadowed. Here again, such circular logic cannot possibly support a *prima facie* case of obviousness.

It is further noted that Peercy relates to a shading method, more particularly to a so-called method of bump mapping, for computing the influence of lighting conditions on the shading of textured surfaces. In the prior art, this method is often called also per-pixel lighting.

The cross (dot) product disclosed in Peercy is used for a completely different purpose, namely to calculate the light-vector, i.e. how much the influence of the light on the polygon is (cf. col. 5, lines 25-34). Accordingly, Peercy uses a cross-product to simulate the influence of lighting conditions on the rendering of textures.

In contrast, according to the claimed invention a cross product is used to extrude an edge and create a soft shadow edge. Accordingly, according to the claimed invention a cross-product is used to interpolate between neighboring soft shadow volumes, as described with reference to Fig. 4 of the application. This is, however, a totally different purpose.

Accordingly, Peercy in combination with any or all of the numerous references cited fails to render obvious the claimed invention.

Accordingly, the rejection of claims 4, 5, 14 and 15 should be reversed.

<u>E. Claims 6, 7, 9, 10, 16, 17 and 19-22 Further Distinguish Over and Are Patentable Over the Contended Combination.</u>

In paragraphs 18-25, the Examiner stated the rejection of, and attempted to state a case of obviousness of, claims 6, 7, 9, 10, 16, 17 and 19-22. As with the foregoing claims, Applicant submits that the Examiner wholly failed to state a prima facie case of obviousness. Such is not supported by the facts, is clearly erroneous and is contrary to the law. Applicant requests the Board to reverse the Examiner's rejection of these claims for the same reasons set forth above with respect to claims 1-5 and 11-15, and

for the following additional reasons.

In paragraph 19, with respect to claims 6 and 16, the Examiner admitted that all of the combination of Frazier (1), (2), (3), Kato, Kilgard and Foran fails to require an update for a change in the viewer's position, direction of view or filed of view. To meet this limitation, the Examiner resorts to Snyder, which the Examiner contends requires an update for viewpoint movement, because this changes the scene. On this basis, the Examiner conclusorily stated that it would have been obvious to modify Frazier (1), (2), (3), Kato, Kilgard and Foran to require an update for a change in position of the viewer, direction of view or field of view as allegedly taught by Snyder because "viewpoint movement changes the scene". This rejection fails for the same reason as do all the other rejections - it is without basis and the Examiner has failed to provide any but a wholly conclusory statement of the alleged obviousness.

Furthermore, the alleged motivation is circular. Here again, the Examiner contends that it would have been obvious to require an update when the viewpoint changes because the scene changes because when the viewpoint changes because the scene changes. Here again, such circular logic cannot possibly support a *prima facie* case of obviousness.

In paragraph 20, the Examiner admitted that Frazier (1), (2), (3) and Kato do not say that they clear the stencil buffer. But, the Examiner cites Kilgard as clearing the stencil buffer because if it was not cleared it might contain an incorrect value. Again, the Examiner conclusorily states it would have been obvious to do this. For the same reasons as above, this rejection fails. It is without support or proper explanation, and the alleged motivation does not suffice to lead a person of ordinary skill to the claimed invention as a whole.

In paragraph 21 with regard to claims 7 and 17, the Examiner admits that Frazier (1), (2), (3) and Kato do not disclose performing a per-pixel stencil operation, increase a value in the stencil buffer for front-facing polygons if the depth of the shadow volume polygon is less than the depth stored in the z-buffer and decease the stencil buffer for

back-facing polygons if passing a depth test. To attempt to remedy these deficiencies, the Examiner resorts to Kilgard of these functions and contends that it would have been obvious to apply these operations to Frazier (1), (2), (3) and Kato "because this creates a shadow volume."

The *prima facie* case fails because the alleged motivation is circular. Here again, the Examiner contends that it would have been obvious to carry out these operations to create a shadow volume because doing so creates a shadow volume. Here again, such circular logic cannot possibly support a *prima facie* case of obviousness.

In paragraph 22 of the Office Action with regard to claims 9 and 19, the Examiner stated:

> In regard to claims 9 and 19, Frazier (3) has multiple lights (page 1, line 22). Because the cube map only has one origin at the position of the light source, multiple light sources mean multiple cube maps.

This statement completely fails to even attempt to show the alleged obviousness of claims 9 and 19, and fails to provide any basis whatsoever for rejection of these claims. Accordingly, the rejection of claims 9 and 19 must be reversed.

In paragraph 23 in regard to claims 10 and 20, the Examiner admitted that the combination of Frazier (1), (2), (3), Kato, Kilgard and Foran fails to have characteristic points of shadows, frames of animation, and threshold values. The Examiner resorts to Snyder, which he alleges teaches frames of animation, storing the location of characteristic points of shadows, and re-rendering shadows if the difference of the characteristic points between subsequent frames exceeds a threshold value, because this evaluates the accuracy of the shadow map for re-use. On this basis, the Examiner conclusorily stated that it would have been obvious to modify Frazier (1), (2), (3), Kato, Kilgard and Foran to have characteristic points of shadows, frames of animation, and threshold values because this evaluates the accuracy of the shadow map for re-use. This rejection fails for the same reason as do all the other rejections - it is without basis

and the Examiner has failed to provide any but a wholly conclusory statement of the alleged obviousness.

Furthermore, the alleged motivation is circular. The Examiner contends that it would have been obvious to have characteristic points of shadows, frames of animation, and threshold values to evaluate the accuracy of the shadow map for re-use because doing so would allow one to evaluate the accuracy of the shadow map for re-use. Here again, such circular logic cannot possibly support a *prima facie* case of obviousness.

In paragraphs 24 and 25 of the Office Action with regard to claim 21, the Examiner stated Frazier (3) has a color buffer that stores color values, a depth buffer that stores depth values, and a stencil buffer for storing stencil mask information. The Examiner admits that the combination of Frazier (1), (2), (3), Kato, Kilgard and Foran fails to disclose texture memory, a rasterizer or pixel engines. In order to remedy these failings, the Examiner resorts to Snyder, which the Examiner contends discloses a rasterizer in communication with a pixel engine, a pixel engine includes a z-buffer and stencil buffer for each pixel, and a tiler containing and communicating with a texture memory and a pixel engine. On this basis, the Examiner conclusorily stated that it would have been obvious to modify Frazier (1), (2), (3), Kato, Kilgard and Foran to have texture memory, a rasterizer or pixel engines "because they perform the operations necessary for the invention". This rejection fails for the same reason as do all the other rejections - it is without basis and the Examiner has failed to provide any but a wholly conclusory statement of the alleged obviousness.

Furthermore, the alleged motivation again in this case is wholly circular. In essence, the Examiner's position is that it would have been obvious to provide these features because doing so allows these features to function. Here again, such circular logic cannot possibly support a *prima facie* case of obviousness.

Accordingly, the rejection of claim 21 must be reversed.

Finally, in paragraph 26, with regard to claim 22, the Examiner contends only:

> In regard to claim 22, Frazier (3) has an alpha buffer to bump the display to 32 bits (page 1, lines 23-24).

This statement fails to even contend that the claimed invention would have been obvious, and completely fails to provide any basis or reasoning whatsoever for why the claimed invention would have been obvious. Accordingly, the rejection of claim 22 must be reversed.

F. Claims 8 and 18 Further Distinguish Over and Are Patentable Over the Contended Combination.

In paragraphs 27 and 28 regarding claims 8 and 18, the Examiner first contends that Frazier's stencil buffer rejects pixels based on the value in the stencil buffer. The Examiner then admits that the combination of Frazier (1), (2), (3), Kato, Kilgard and Foran fails to disclose that they access the cube map faces by the greatest magnitude coordinate and select texels by the other two components. However, to remedy this failing, the Examiner resorts to Dietrich, which the Examiner contends accesses the cube map faces by the greatest magnitude coordinate and selects texels by the other two components. On this basis, the Examiner conclusorily stated that it would have been obvious to modify Frazier (1), (2), (3), Kato, Kilgard and Foran to access the cube map faces by the greatest magnitude coordinate and selects texels by the other two components "because it is simple". This rejection fails for the same reason as do all the other rejections - it is without basis and the Examiner has failed to provide any but a wholly conclusory statement of the alleged obviousness.

Furthermore, the alleged motivation is wholly conclusory and self-serving. Lacking any other motivation, the Examiner simply contends that making the alleged modification would be motivated by its simplicity. This contended motivation cannot possibly support a *prima facie* case of obviousness. It is no motivation at all.

Accordingly, the rejection of claims 8 and 18 should be reversed.

G. The Art Recognizes the Advance Embodied in the Presently Claimed Invention, Which Provides Secondary Evidence of the Non-Obviousness Thereof.

Appellant's invention has been recognized in the art as a significant advance in shadow-rendering methods. In the paper "Rendering Fake Soft Shadows with Smoothies", co-authored by Eric Chan and Frédo Durand, Eurographics Symposium on Rendering 2003, the authors note the presently disclosed and claimed invention. This paper is available on the internet at the following URL: http://graphics.lcs.mit.edu/~ericchan/papers/smoothie/smoothie.pdf. In this internet-available version of the paper, in an electronic overlay dated 27 August 2003 added to the first page of the paper, the authors recognize the importance of the presently disclosed and claimed invention by making the following statement:

> The method presented in this paper is also related to the method described in US patent application no. US 2003/0112237A1, filed by Marco Corbetta on behalf of Crytek GmbH in December 2001. The two methods were developed independently.

Thus, the authors of this 2003 paper explicitly acknowledge the presently disclosed and claimed invention, by citation to its publication number US 2003/0112237 A1, and note that its method is related to the method the authors presented at the above-noted symposium, more than one year *after* the filing of the present application. This paper was presented at the noted symposium subsequent to the filing but prior to the publication of the present application, thus resulting in the subsequently added acknowledgment of Appellant's invention in the electronic overlay added to the first page of the internet version of the paper, since the authors are believed to have been unaware of the present application when the paper was originally presented.

Appellant requests the Board to refer to this paper on the internet at the above-noted URL. Appellant submits the reference to this paper both as an indication of the state of the art *subsequent to* the filing of the present application and as an indication of

the non-obviousness of the presently claimed invention. As noted in the above-quoted electronic overlay, the authors of the paper developed their method independently of Appellant's invention. The method was considered of sufficient importance to merit presentation at an international symposium. Appellant respectfully submits that this paper, its presentation and the electronic overlay constitute strong secondary considerations as to the non-obviousness of the claimed invention. This paper was not earlier submitted because Appellant has always considered that the presently disclosed and claimed invention fully distinguishes over the prior art and did not consider it necessary to submit such evidence until the Examiner persisted in his rejections of Appellant's claims which, for the reasons set forth in the foregoing, Appellant considers baseless and contrary to both fact and law. Accordingly, Appellant respectfully submits that the Board should consider the contents of this paper as a strong secondary consideration of the non-obviousness of Appellant's disclosed and claimed invention, and that the foregoing constitutes "good and sufficient reasons why the affidavit or evidence is necessary and was not earlier presented" as set forth in 37 C.F.R. 41.33(d)(1).

VIII. CONCLUSION

For all these reasons, the rejection of Appellant's claims 1-22 under 35 U.S.C. §103(a) should be reversed because the cited references fail to teach or disclose all of the features of Appellant's claimed invention and because the Examiner has wholly failed to state a proper factual or legal basis for the contention that Appellant's claims would have been *prima facie* obvious. Appellants respectfully request reversal of the Examiner's rejections of Appellants' claimed invention of claims 1-22 under Section 103(a). Appellants respectfully submit that all of the pending claims are in condition for allowance, and respectfully request notice to such effect from the Examiner and/or the Board.

In the event issues remain in the prosecution of this application, Appellants request that the Examiner telephone the undersigned attorney to expedite further consideration and/or allowance of the claims of this application. **The Commissioner is authorized to charge the fee of $170.00 for the filing of an Appeal Brief by a small entity to Deposit Account #18-0988, Docket No. BLASP2225US.** Should a Petition for Extension of Time be necessary for the present Appeal Brief to be timely filed (or if such a petition has been made and an additional extension is necessary) petition therefor is hereby made and, if any additional fees are required for the filing of this paper, the Commissioner is authorized to charge those fees to Deposit Account #18-0988, Docket No. BLASP2225US.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR

Date: October 12, 2004

Thomas W. Adams
Registration No. 35,047

1621 Euclid Ave., 19th Floor
Cleveland, Ohio 44115
(216) 621-1113

C:\My Files\BLAS\P2225\blas2225.appBRF.wpd